

Administración de Nginx Web Server

PROYECTO FINAL

PRESENTA

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LICENCIATURA EN MATEMÁTICAS APLICADAS
UNIVERSIDAD AUTÓNOMA METROPOLITANA
MAESTRÍA EN INTELIGENCIA ARTIFICIAL
INSTITUTO POLITÉCNICO NACIONAL
+7 AÑOS IMPARTIENDO CURSOS AVANZADOS
REACT | ANGULAR | VUE | NODEJS | EXPRESS JS
MONGODB | ORACLE | SQL SERVER
JAVA | SPRING BOOT | HIBERNATE | MICROSERVICIOS
LINUX | NGINX | AMAZON WS | AZURE



CONTENIDO DEL CURSO

Módulo 1. Descarga e instalación de Nginx

Módulo 2. Configuración básica de Nginx

Módulo 3. Configuración HTTP

Módulo 4. Configuración de módulos

Módulo 5. PHP y Python con Nginx

Módulo 6. Nginx como servidor de aplicaciones

Módulo 7. Apache y Nginx juntos

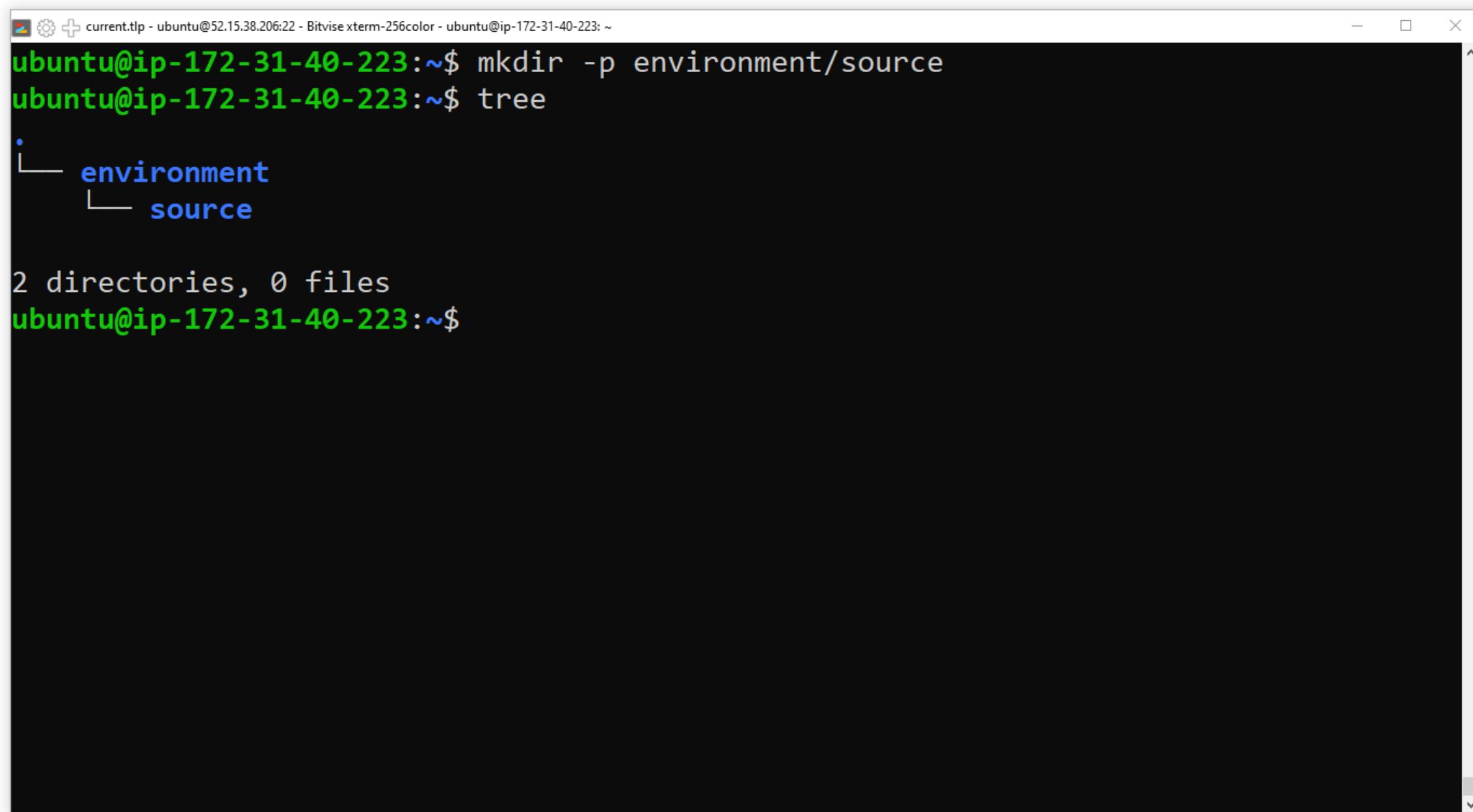
Módulo 8. De Apache a Nginx

Módulo 9. Introducción al equilibrio de carga y la optimización

Módulo 10. Casos de estudio

Módulo 11. Solución de problemas

CONFIGURAR LOS AMBIENTES



A screenshot of a terminal window titled "current.tlp" showing a Linux command-line session. The session starts with the user "ubuntu" at IP address "ip-172-31-40-223". The user runs the command "mkdir -p environment/source" to create a directory structure. Then, they run "tree" to display the directory hierarchy, which shows a single directory named "environment" containing a subdirectory "source". The output indicates there are 2 directories and 0 files. The terminal window has a dark background with light-colored text.

```
ubuntu@ip-172-31-40-223:~$ mkdir -p environment/source
ubuntu@ip-172-31-40-223:~$ tree
.
└── environment
    └── source

2 directories, 0 files
ubuntu@ip-172-31-40-223:~$
```

mkdir -p environment/source



The screenshot shows a terminal window titled "current.tlp - ubuntu@52.15.38.206:22 - Bitvise xterm-256color - ubuntu@ip-172-31-40-223:~". The terminal displays the following command and its execution:

```
ubuntu@ip-172-31-40-223:~$ curl http://nginx.org/download/nginx-1.21.5.tar.gz | tar -xz -C environment/source/
% Total    % Received % Xferd  Average Speed   Time      Time      Time  Current
               Dload  Upload   Total   Spent    Left  Speed
100 1047k  100 1047k    0      0  1144k      0  --::--  --::--  --::-- 1143k
ubuntu@ip-172-31-40-223:~$ tree -L 3
.
└── environment
    └── source
        └── nginx-1.21.5

3 directories, 0 files
ubuntu@ip-172-31-40-223:~$
```

curl http://nginx.org/download/nginx-1.21.5.tar.gz | tar -xz -C environment/source/



```
current.tlp - ubuntu@52.15.38.206:22 - Bitvise xterm-256color - ubuntu@ip-172-31-40-223: ~
ubuntu@ip-172-31-40-223:~$ sudo apt update
Hit:1 http://us-east-2.ec2.archive.ubuntu.com/ubuntu focal InRelease
Hit:2 http://us-east-2.ec2.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:3 http://us-east-2.ec2.archive.ubuntu.com/ubuntu focal-backports InRelease
Hit:4 http://security.ubuntu.com/ubuntu focal-security InRelease
Hit:5 https://pkgs.nginx.com/plus/ubuntu focal InRelease
Reading package lists... Done
Building dependency tree
Reading state information... Done
23 packages can be upgraded. Run 'apt list --upgradable' to see them.
ubuntu@ip-172-31-40-223:~$ sudo apt install gcc make libxml2-utils xsltproc devscripts
ts quilt debhelper libssl-dev libpcre3-dev zlib1g-dev libgeoip-dev libgd-dev -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
debhelper is already the newest version (12.10ubuntu1).
devscripts is already the newest version (2.20.2ubuntu2).
gcc is already the newest version (4:9.3.0-1ubuntu2).
libpcre3-dev is already the newest version (2:8.39-12build1).
make is already the newest version (4.2.1-1.2).
xsltproc is already the newest version (1.1.34-4).
```

sudo apt install gcc make libxml2-utils xsltproc devscripts quilt debhelper libssl-dev
libpcre3-dev zlib1g-dev libgeoip-dev libgd-dev -y



```
current.tlp - ubuntu@52.15.38.206:22 - Bitvise xterm-256color - ubuntu@ip-172-31-40-223: ~/environment/source/nginx-1.21.5
ubuntu@ip-172-31-40-223:~/environment/source/nginx-1.21.5$ ./configure --prefix=/home/ubuntu/environment/nginx.1
checking for OS
+ Linux 5.11.0-1023-aws x86_64
checking for C compiler ... found
+ using GNU C compiler
+ gcc version: 9.3.0 (Ubuntu 9.3.0-17ubuntu1~20.04)
checking for gcc -pipe switch ... found
checking for -Wl,-E switch ... found
checking for gcc builtin atomic operations ... found
checking for C99 variadic macros ... found
checking for gcc variadic macros ... found
checking for gcc builtin 64 bit byteswap ... found
checking for unistd.h ... found
checking for inttypes.h ... found
checking for limits.h ... found
checking for sys/filio.h ... not found
checking for sys/param.h ... found
checking for sys/mount.h ... found
checking for sys/statvfs.h ... found
checking for crypt.h ... found
```

./configure --prefix=/home/ubuntu/environment/nginx.1



```
current.tlp - ubuntu@52.15.38.206:22 - Bitvise xterm-256color - ubuntu@ip-172-31-40-223: ~/environment/source/nginx-1.21.5
ubuntu@ip-172-31-40-223:~/environment/source/nginx-1.21.5$ make
make -f objs/Makefile
make[1]: Entering directory '/home/ubuntu/environment/source/nginx-1.21.5'
cc -c -pipe -O -W -Wall -Wpointer-arith -Wno-unused-parameter -Werror -g -I src/core -I src/event -I src/event/modules -I src/os/unix -I objs \
    -o objs/src/core/nginx.o \
    src/core/nginx.c
cc -c -pipe -O -W -Wall -Wpointer-arith -Wno-unused-parameter -Werror -g -I src/core -I src/event -I src/event/modules -I src/os/unix -I objs \
    -o objs/src/core/ngx_log.o \
    src/core/ngx_log.c
cc -c -pipe -O -W -Wall -Wpointer-arith -Wno-unused-parameter -Werror -g -I src/core -I src/event -I src/event/modules -I src/os/unix -I objs \
    -o objs/src/core/ngx_palloc.o \
    src/core/ngx_palloc.c
cc -c -pipe -O -W -Wall -Wpointer-arith -Wno-unused-parameter -Werror -g -I src/core -I src/event -I src/event/modules -I src/os/unix -I objs \
    -o objs/src/core/ngx_array.o \
    src/core/ngx_array.c
cc -c -pipe -O -W -Wall -Wpointer-arith -Wno-unused-parameter -Werror -g -I src/core -I src/event -I src/event/modules -I src/os/unix -I objs \
```

make



```
current.tlp - ubuntu@52.15.38.206:22 - Bitvise xterm-256color - ubuntu@ip-172-31-40-223: ~/environment/source/nginx-1.21.5
ubuntu@ip-172-31-40-223:~/environment/source/nginx-1.21.5$ make install
make -f objs/Makefile install
make[1]: Entering directory '/home/ubuntu/environment/source/nginx-1.21.5'
test -d '/home/ubuntu/environment/nginx.1' || mkdir -p '/home/ubuntu/environment/nginx.1'
test -d '/home/ubuntu/environment/nginx.1/sbin' \
      || mkdir -p '/home/ubuntu/environment/nginx.1/sbin'
test ! -f '/home/ubuntu/environment/nginx.1/sbin/nginx' \
      || mv '/home/ubuntu/environment/nginx.1/sbin/nginx' \
            '/home/ubuntu/environment/nginx.1/sbin/nginx.old'
cp objs/nginx '/home/ubuntu/environment/nginx.1/sbin/nginx'
test -d '/home/ubuntu/environment/nginx.1/conf' \
      || mkdir -p '/home/ubuntu/environment/nginx.1/conf'
cp conf/koi-win '/home/ubuntu/environment/nginx.1/conf'
cp conf/koi-utf '/home/ubuntu/environment/nginx.1/conf'
cp conf/win-utf '/home/ubuntu/environment/nginx.1/conf'
test -f '/home/ubuntu/environment/nginx.1/conf/mime.types' \
      || cp conf/mime.types '/home/ubuntu/environment/nginx.1/conf'
cp conf/mime.types '/home/ubuntu/environment/nginx.1/conf/mime.types.default'
test -f '/home/ubuntu/environment/nginx.1/conf/fastcgi_params' \
      || cp conf/fastcgi_params '/home/ubuntu/environment/nginx.1/conf'
```

make install



```
current.tlp - ubuntu@52.15.38.206:22 - Bitvise xterm-256color - ubuntu@ip-172-31-40-223: ~
ubuntu@ip-172-31-40-223:~$ cd ~
ubuntu@ip-172-31-40-223:~$ tree -L 3
.
└── environment
    ├── nginx.1
    │   ├── conf
    │   ├── html
    │   ├── logs
    │   └── sbin
    └── source
        └── nginx-1.21.5

8 directories, 0 files
ubuntu@ip-172-31-40-223:~$
```

cd ~



Segundo ambiente: nginx.2

```
./configure --prefix=/home/ubuntu/environment/nginx.2  
make  
make install
```

Tercer ambiente: nginx.3

```
./configure --prefix=/home/ubuntu/environment/nginx.3  
make  
make install
```



```
current.tlp - ubuntu@52.15.38.206:22 - Bitvise xterm-256color - ubuntu@ip-172-31-40-223: ~
ubuntu@ip-172-31-40-223:~/environment/source/nginx-1.21.5$ cd ~
ubuntu@ip-172-31-40-223:~$ tree -L 3
.
└── environment
    ├── nginx.1
    │   ├── conf
    │   ├── html
    │   ├── logs
    │   └── sbin
    ├── nginx.2
    │   ├── conf
    │   ├── html
    │   ├── logs
    │   └── sbin
    ├── nginx.3
    │   ├── conf
    │   ├── html
    │   ├── logs
    │   └── sbin
    └── source
        └── nginx-1.21.5

18 directories, 0 files
ubuntu@ip-172-31-40-223:~$
```

cd ~



CONFIGURAR LOS SERVICIOS PARA CADA AMBIENTES

/lib/systemd/system/nginx.1.service

[Unit]

Description=Nginx Server 1 - Principal /home/ubuntu/environment/nginx.1

Documentation=man:nginx(8)

After=network.target

[Service]

Type=forking

PIDFile=/home/ubuntu/environment/nginx.1/logs/nginx.pid

ExecStartPre=/home/ubuntu/environment/nginx.1/sbin/nginx -t -q -g 'daemon on; master_process on;'

ExecStart=/home/ubuntu/environment/nginx.1/sbin/nginx -g 'daemon on; master_process on;'

ExecReload=/home/ubuntu/environment/nginx.1/sbin/nginx -s reload -g 'daemon on; master_process on;'

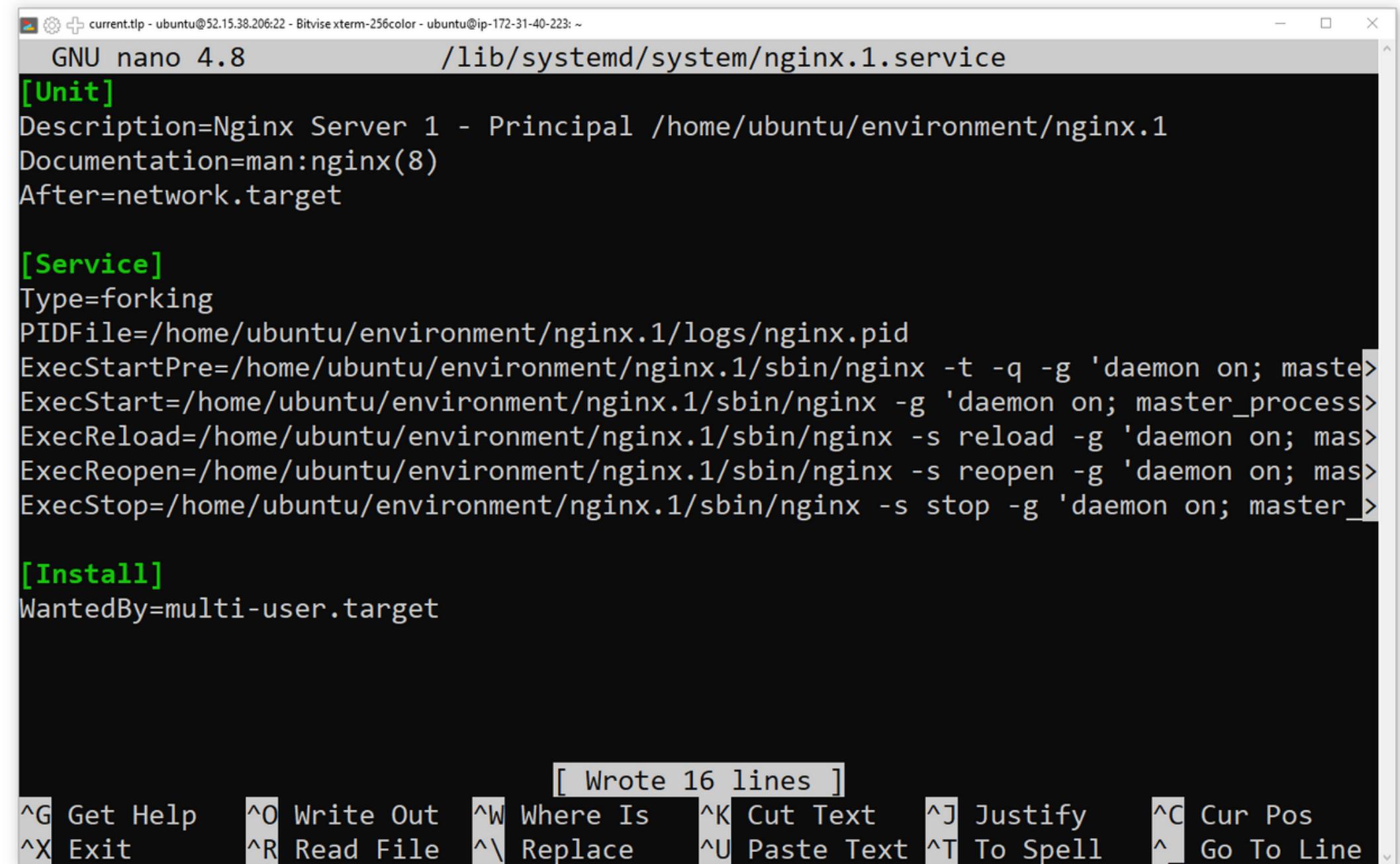
ExecReopen=/home/ubuntu/environment/nginx.1/sbin/nginx -s reopen -g 'daemon on; master_process on;'

ExecStop=/home/ubuntu/environment/nginx.1/sbin/nginx -s stop -g 'daemon on; master_process on;'

[Install]

WantedBy=multi-user.target





```
current.tlp - ubuntu@52.15.38.206:22 - Bitvise xterm-256color - ubuntu@ip-172-31-40-223: ~
GNU nano 4.8          /lib/systemd/system/nginx.1.service
[Unit]
Description=Nginx Server 1 - Principal /home/ubuntu/environment/nginx.1
Documentation=man:nginx(8)
After=network.target

[Service]
Type=forking
PIDFile=/home/ubuntu/environment/nginx.1/logs/nginx.pid
ExecStartPre=/home/ubuntu/environment/nginx.1/sbin/nginx -t -q -g 'daemon on; master_process'
ExecStart=/home/ubuntu/environment/nginx.1/sbin/nginx -g 'daemon on; master_process'
ExecReload=/home/ubuntu/environment/nginx.1/sbin/nginx -s reload -g 'daemon on; master_process'
ExecReopen=/home/ubuntu/environment/nginx.1/sbin/nginx -s reopen -g 'daemon on; master_process'
ExecStop=/home/ubuntu/environment/nginx.1/sbin/nginx -s stop -g 'daemon on; master_process'

[Install]
WantedBy=multi-user.target

[ Wrote 16 lines ]
^G Get Help      ^O Write Out    ^W Where Is     ^K Cut Text   ^J Justify   ^C Cur Pos
^X Exit         ^R Read File    ^\ Replace      ^U Paste Text ^T To Spell  ^_ Go To Line
```

sudo nano /lib/systemd/system/nginx.1.service

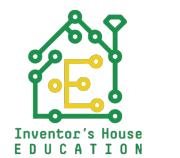


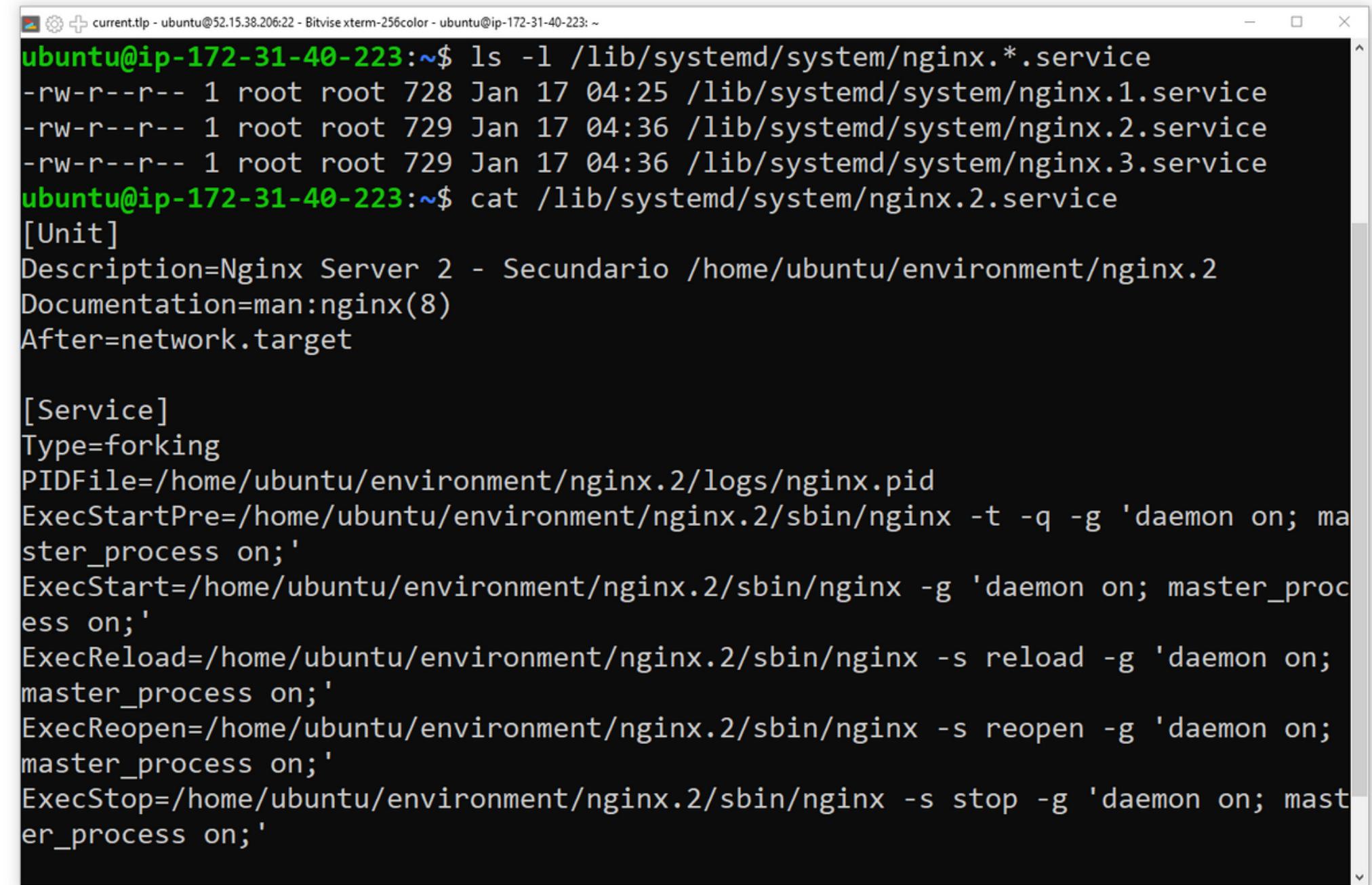
Segundo ambiente: nginx.2

/lib/systemd/system/nginx.2.service

Tercer ambiente: nginx.3

/lib/systemd/system/nginx.3.service





A screenshot of a Bitvise xterm-256color terminal window on an Ubuntu system. The window title is "current.tlp - ubuntu@52.15.38.206:22 - Bitvise xterm-256color - ubuntu@ip-172-31-40-223:~". The terminal displays the output of the command "ls -l /lib/systemd/system/nginx.*.service", which lists three service files: nginx.1.service, nginx.2.service, and nginx.3.service. The user then runs "cat /lib/systemd/system/nginx.2.service" to view the contents of the nginx.2.service file. The file contains configuration for an Nginx server, including [Unit], [Service], and [Install] sections.

```
ubuntu@ip-172-31-40-223:~$ ls -l /lib/systemd/system/nginx.*.service
-rw-r--r-- 1 root root 728 Jan 17 04:25 /lib/systemd/system/nginx.1.service
-rw-r--r-- 1 root root 729 Jan 17 04:36 /lib/systemd/system/nginx.2.service
-rw-r--r-- 1 root root 729 Jan 17 04:36 /lib/systemd/system/nginx.3.service
ubuntu@ip-172-31-40-223:~$ cat /lib/systemd/system/nginx.2.service
[Unit]
Description=Nginx Server 2 - Secundario /home/ubuntu/environment/nginx.2
Documentation=man:nginx(8)
After=network.target

[Service]
Type=forking
PIDFile=/home/ubuntu/environment/nginx.2/logs/nginx.pid
ExecStartPre=/home/ubuntu/environment/nginx.2/sbin/nginx -t -q -g 'daemon on; master_process on;';
ExecStart=/home/ubuntu/environment/nginx.2/sbin/nginx -g 'daemon on; master_process on;';
ExecReload=/home/ubuntu/environment/nginx.2/sbin/nginx -s reload -g 'daemon on; master_process on;';
ExecReopen=/home/ubuntu/environment/nginx.2/sbin/nginx -s reopen -g 'daemon on; master_process on;';
ExecStop=/home/ubuntu/environment/nginx.2/sbin/nginx -s stop -g 'daemon on; master_process on;'
```

ls -l /lib/systemd/system/nginx.*.service



HABILITAR LA CONFIGURACIÓN PRINCIPAL A SITES-ENABLED

~/environment/nginx.1/conf/nginx.conf

```
# Nginx Server 1 - Principal

user ubuntu;

worker_processes 1;

events {
    worker_connections 1024;
}

http {
    include /home/ubuntu/environment/nginx.1/sites-enabled/*.conf;
}
```



current.tlp - ubuntu@52.15.38.206:22 - Bitvise xterm-256color - ubuntu@ip-172-31-40-223: ~

GNU nano 4.8 environment/nginx.1/conf/nginx.conf

```
# Nginx Server 1 - Principal

user    ubuntu;

worker_processes 1;

events {
    worker_connections 1024;
}

http {
    include /home/ubuntu/environment/nginx.1/sites-enabled/*.conf;
}
```

[Wrote 13 lines]

^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify ^C Cur Pos
^X Exit ^R Read File ^\ Replace ^U Paste Text ^T To Spell ^_ Go To Line

nano ~/environment/nginx.1/conf/nginx.conf



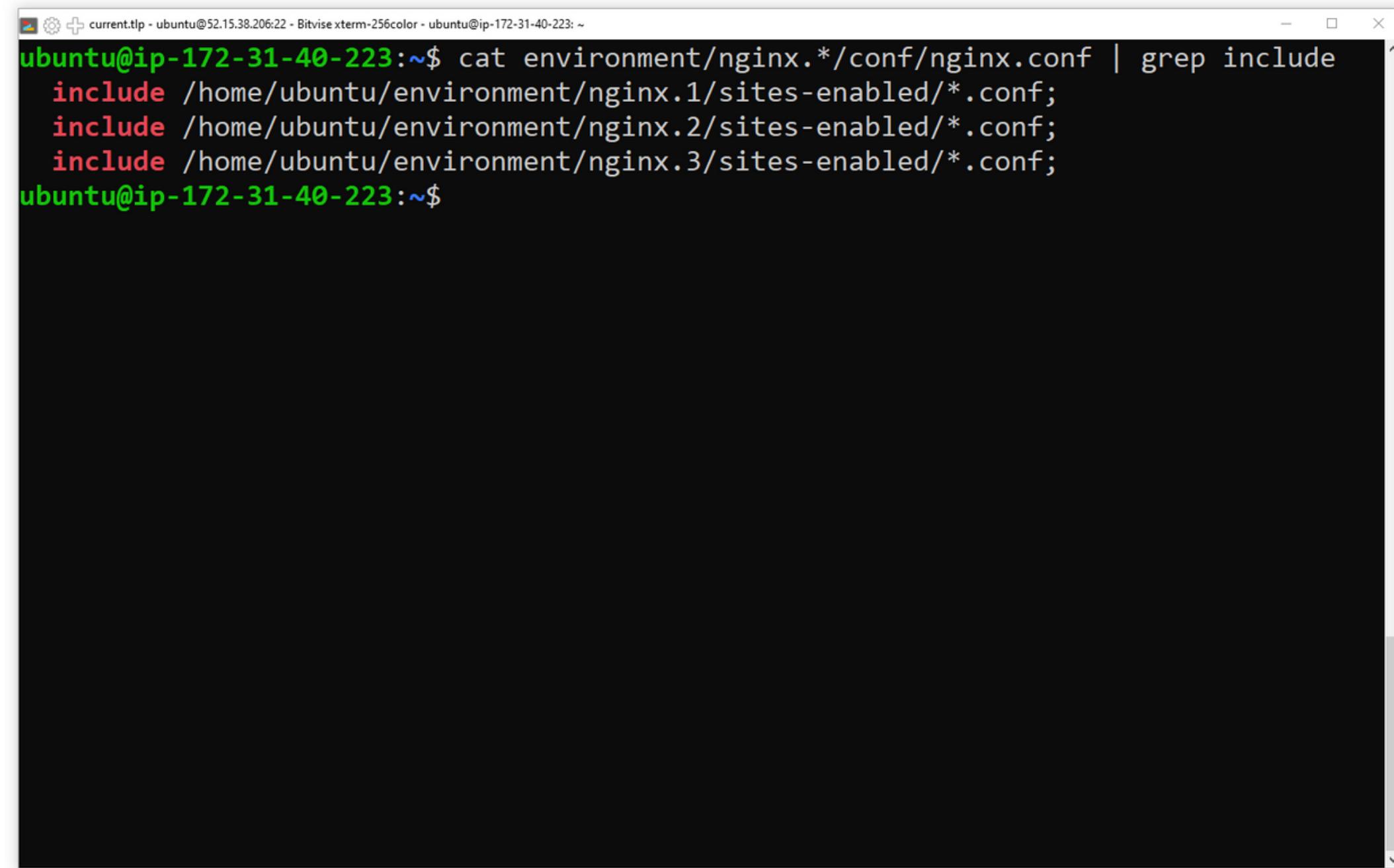
Segundo ambiente: nginx.2

~/environment/nginx.2/conf/nginx.conf

Tercer ambiente: nginx.3

~/environment/nginx.3/conf/nginx.conf



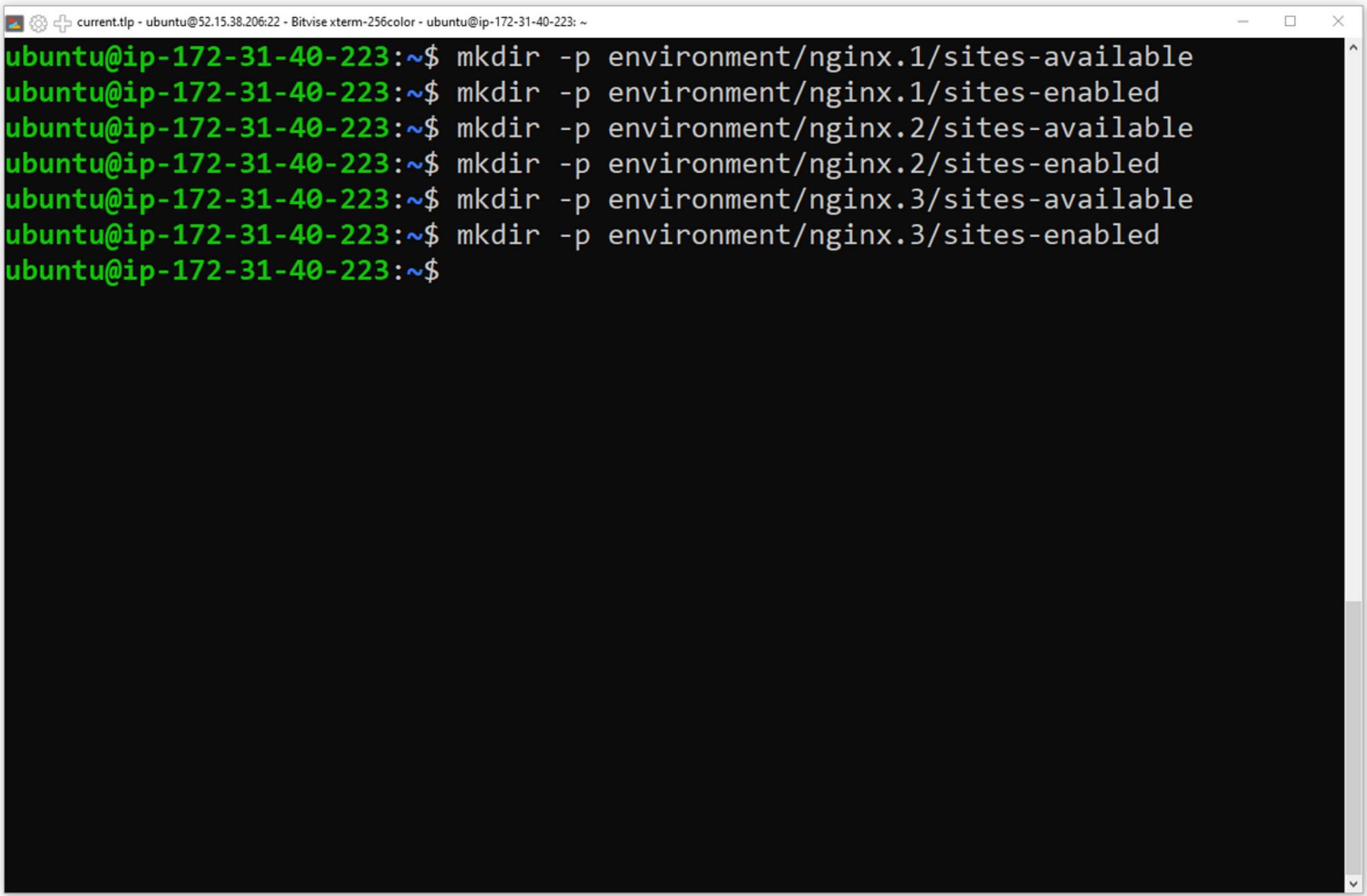


A screenshot of a terminal window titled "current.tlp" showing the command "cat environment/nginx.*/conf/nginx.conf | grep include". The output lists three includes pointing to files in "/home/ubuntu/environment/nginx.1/sites-enabled/*.conf", "/home/ubuntu/environment/nginx.2/sites-enabled/*.conf", and "/home/ubuntu/environment/nginx.3/sites-enabled/*.conf". The terminal is running on an Ubuntu system with IP 172.31.40.223.

```
ubuntu@ip-172-31-40-223:~$ cat environment/nginx.*/conf/nginx.conf | grep include
include /home/ubuntu/environment/nginx.1/sites-enabled/*.conf;
include /home/ubuntu/environment/nginx.2/sites-enabled/*.conf;
include /home/ubuntu/environment/nginx.3/sites-enabled/*.conf;
ubuntu@ip-172-31-40-223:~$
```

cat environment/nginx.*/conf/nginx.conf | grep include





A screenshot of a terminal window titled "current.tlp" running on an Ubuntu system. The window shows the command line history:

```
ubuntu@ip-172-31-40-223:~$ mkdir -p environment/nginx.1/sites-available
ubuntu@ip-172-31-40-223:~$ mkdir -p environment/nginx.1/sites-enabled
ubuntu@ip-172-31-40-223:~$ mkdir -p environment/nginx.2/sites-available
ubuntu@ip-172-31-40-223:~$ mkdir -p environment/nginx.2/sites-enabled
ubuntu@ip-172-31-40-223:~$ mkdir -p environment/nginx.3/sites-available
ubuntu@ip-172-31-40-223:~$ mkdir -p environment/nginx.3/sites-enabled
ubuntu@ip-172-31-40-223:~$
```

mkdir -p environment/nginx.n/sites-available
mkdir -p environment/nginx.n/sites-enabled



CONFIGURAR EL SITIO POR DEFECTO EN CADA AMBIENTE

~/environment/nginx.1/sites-available/default.conf

```
# Nginx Server 1 - Principal | default.conf
```

```
server {  
    listen 80;  
    server_name server1.com;  
  
    location / {  
        root /home/ubuntu/environment/nginx.1/www;  
    }  
  
    location /2/ {  
        proxy_pass http://server2.com/;  
    }  
  
    location /3/ {  
        proxy_pass http://server3.com/;  
    }  
  
}  
  
# ... continua (1)
```

```
# ... sigue aquí (1)
```

```
server {  
    listen 80;  
    server_name server2.com;  
  
    location / {  
        proxy_pass http://localhost:3000/;  
        proxy_set_header Host server2.com;  
    }  
  
}
```

```
# ... sigue aquí (2)
```

```
server {  
    listen 80;  
    server_name server3.com;  
  
    location / {  
        proxy_pass http://localhost:4000/;  
        proxy_set_header Host server3.com;  
    }  
  
}
```



~/environment/nginx.2/sites-available/default.conf

```
# Nginx Server 2 - Secundario | default.conf
```

```
server {  
    listen 3000;  
  
    location / {  
        root /home/ubuntu/environment/nginx.2/www;  
    }  
  
}
```

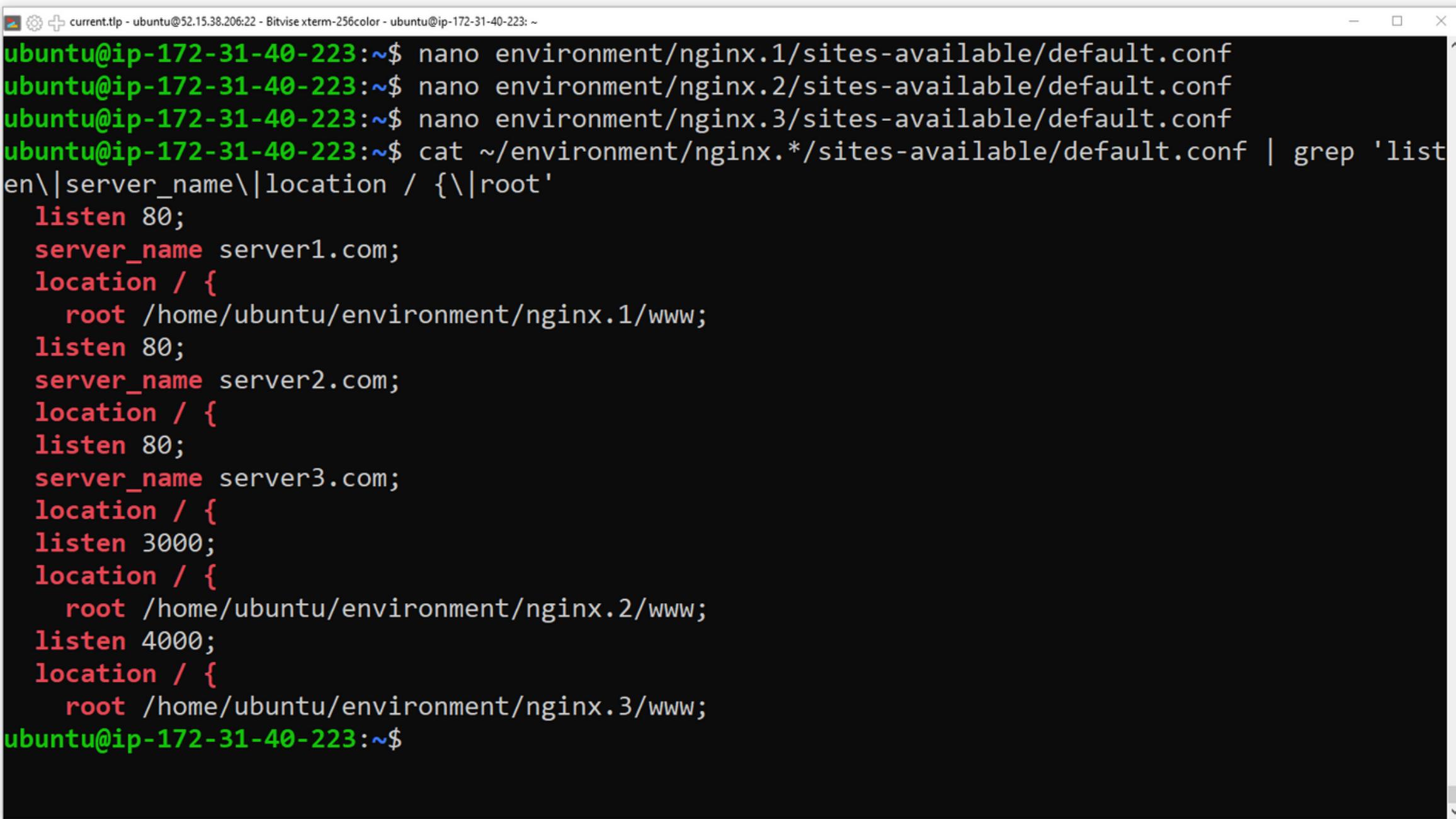


~/environment/nginx.3/sites-available/default.conf

```
# Nginx Server 3 - Secundario | default.conf
```

```
server {  
    listen 4000;  
  
    location / {  
        root /home/ubuntu/environment/nginx.3/www;  
    }  
  
}
```





The screenshot shows a terminal window titled "current.tlp" running on an Ubuntu system with IP 52.15.38.206:22 via Bitvise xterm-256color. The user is navigating through three Nginx configuration files: "environment/nginx.1/sites-available/default.conf", "environment/nginx.2/sites-available/default.conf", and "environment/nginx.3/sites-available/default.conf". The user then runs the command "cat ~/environment/nginx.*/sites-available/default.conf | grep 'listen\|server_name\|location / {\|root'" to search for specific directives. The output shows the configuration for three servers: server1.com (port 80, root /home/ubuntu/environment/nginx.1/www), server2.com (port 80, root /home/ubuntu/environment/nginx.2/www), and server3.com (port 3000, root /home/ubuntu/environment/nginx.3/www).

```
ubuntu@ip-172-31-40-223:~$ nano environment/nginx.1/sites-available/default.conf
ubuntu@ip-172-31-40-223:~$ nano environment/nginx.2/sites-available/default.conf
ubuntu@ip-172-31-40-223:~$ nano environment/nginx.3/sites-available/default.conf
ubuntu@ip-172-31-40-223:~$ cat ~/environment/nginx.*/sites-available/default.conf | grep 'listen\|server_name\|location / {\|root'
listen 80;
server_name server1.com;
location / {
    root /home/ubuntu/environment/nginx.1/www;
}
listen 80;
server_name server2.com;
location / {
    listen 80;
    server_name server3.com;
}
location / {
    listen 3000;
}
location / {
    root /home/ubuntu/environment/nginx.2/www;
}
listen 4000;
location / {
    root /home/ubuntu/environment/nginx.3/www;
}
ubuntu@ip-172-31-40-223:~$
```

cat ~/environment/nginx.*/sites-available/default.conf | grep
'listen\|server_name\|location / {\|root'



ENLAZAR LOS DOMINIOS VIRTUALES

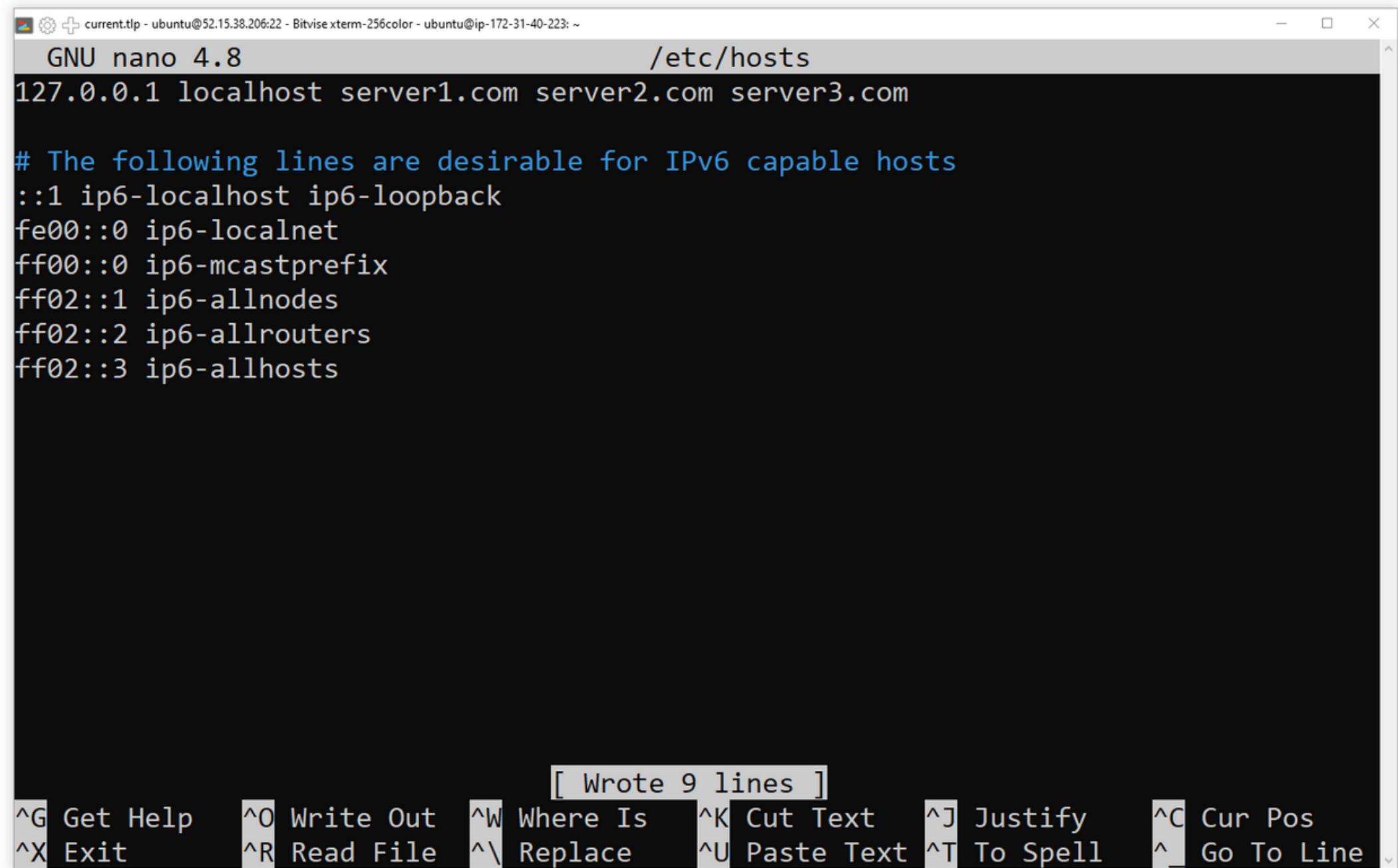
/etc/hosts

```
127.0.0.1 localhost server1.com server2.com server3.com
```

```
# The following lines are desirable for IPv6 capable hosts
```

```
::1 ip6-localhost ip6-loopback  
fe00::0 ip6-localnet  
ff00::0 ip6-mcastprefix  
ff02::1 ip6-allnodes  
ff02::2 ip6-allrouters  
ff02::3 ip6-allhosts
```





```
current.tlp - ubuntu@52.15.38.206:22 - Bitvise xterm-256color - ubuntu@ip-172-31-40-223: ~
GNU nano 4.8          /etc/hosts
127.0.0.1 localhost server1.com server2.com server3.com

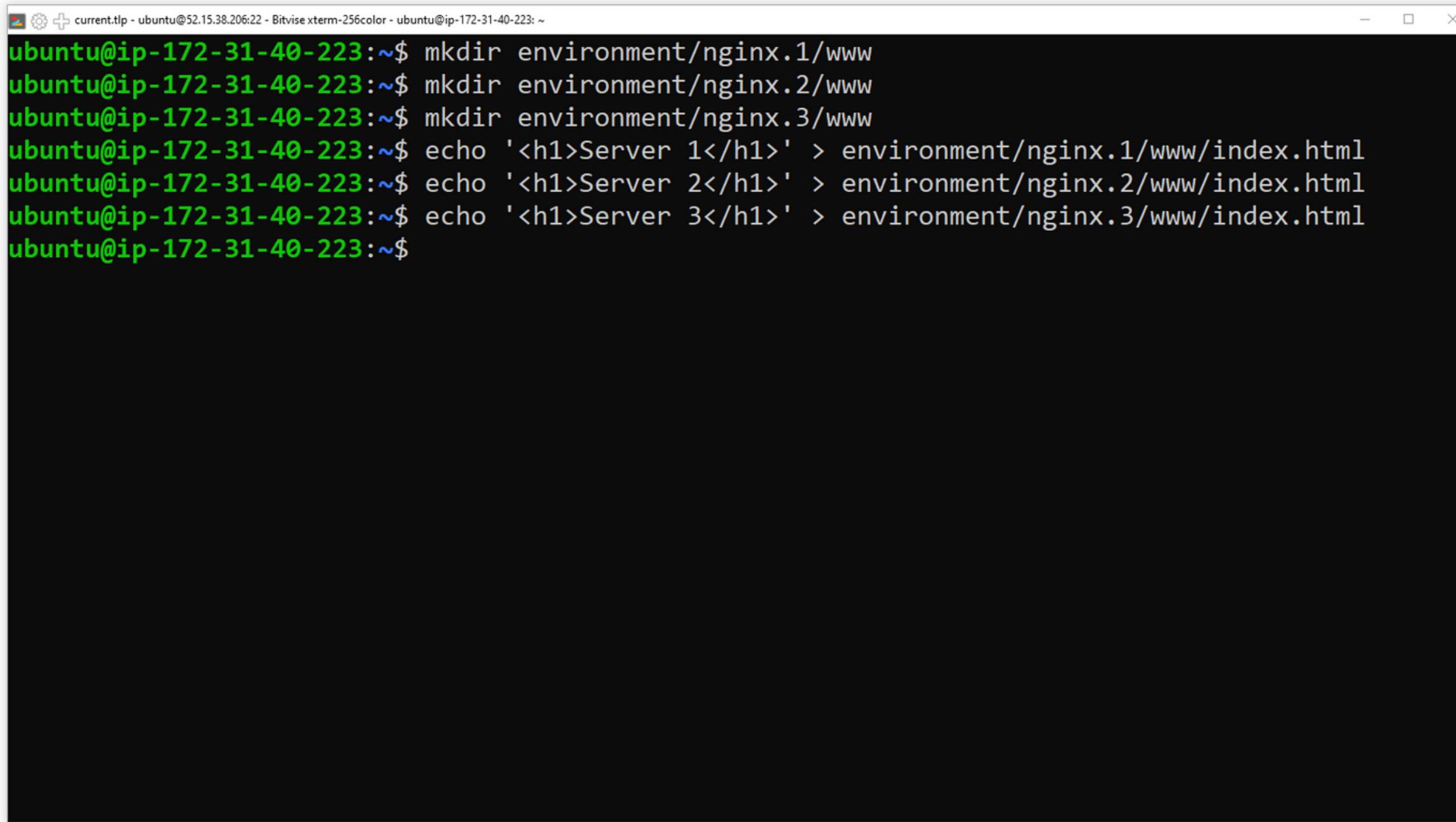
# The following lines are desirable for IPv6 capable hosts
::1 ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
ff02::3 ip6-allhosts

[ Wrote 9 lines ]
^G Get Help    ^O Write Out   ^W Where Is    ^K Cut Text   ^J Justify   ^C Cur Pos
^X Exit       ^R Read File   ^\ Replace     ^U Paste Text ^T To Spell  ^_ Go To Line
```

sudo nano /etc/hosts



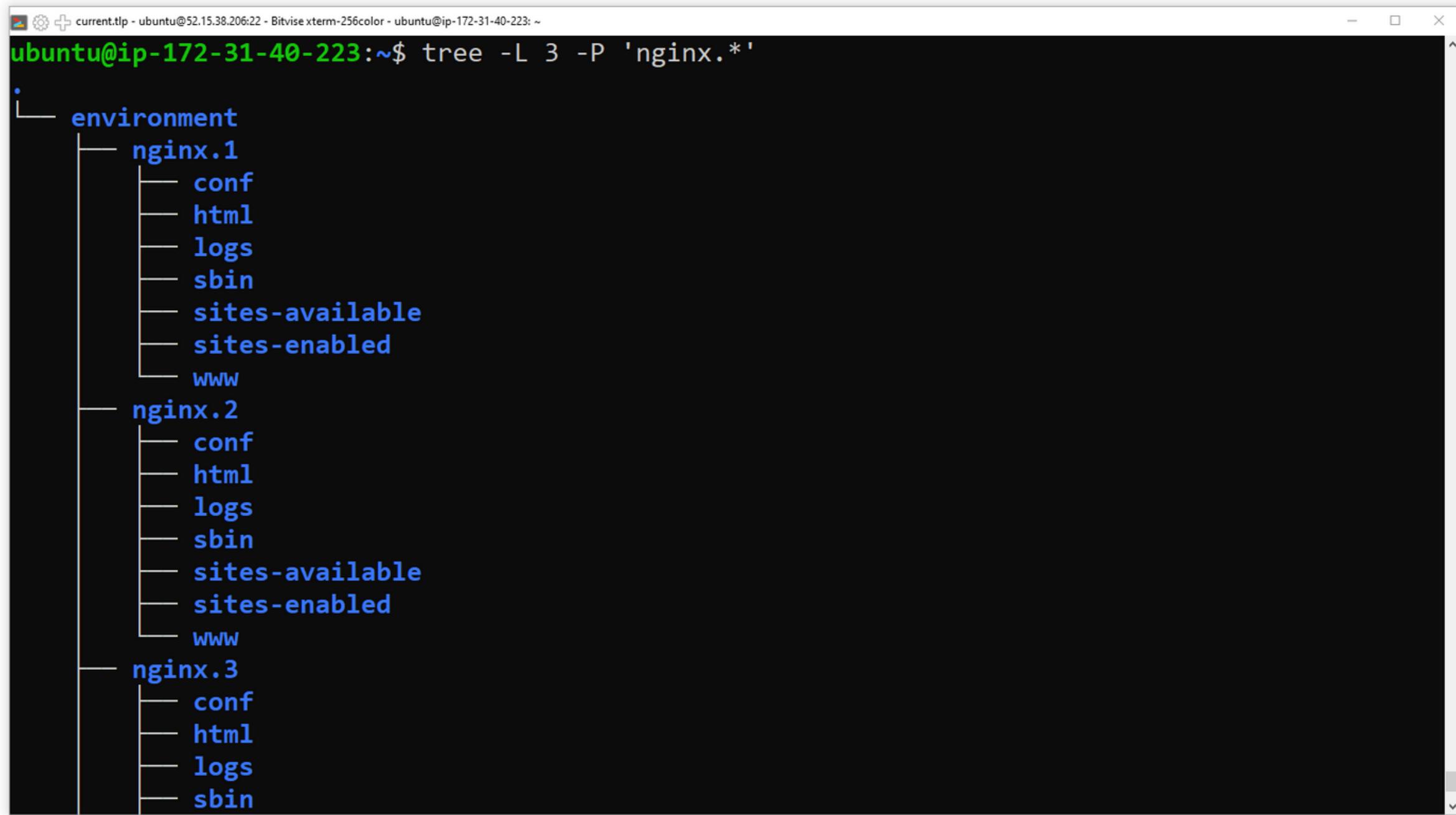
**GENERAR LOS ARCHIVOS INDEX
PRINCIPALES PARA CADA AMBIENTE**



```
current.tlp - ubuntu@52.15.38.206:22 - Bitvise xterm-256color - ubuntu@ip-172-31-40-223: ~
ubuntu@ip-172-31-40-223:~$ mkdir environment/nginx.1/www
ubuntu@ip-172-31-40-223:~$ mkdir environment/nginx.2/www
ubuntu@ip-172-31-40-223:~$ mkdir environment/nginx.3/www
ubuntu@ip-172-31-40-223:~$ echo '<h1>Server 1</h1>' > environment/nginx.1/www/index.html
ubuntu@ip-172-31-40-223:~$ echo '<h1>Server 2</h1>' > environment/nginx.2/www/index.html
ubuntu@ip-172-31-40-223:~$ echo '<h1>Server 3</h1>' > environment/nginx.3/www/index.html
ubuntu@ip-172-31-40-223:~$
```

mkdir environment/nginx.n/www
echo '<h1>Server n</h1>' > environment/nginx.n/www/index.html





```
ubuntu@ip-172-31-40-223:~$ tree -L 3 -P 'nginx.*'
.
└── environment
    ├── nginx.1
    │   ├── conf
    │   ├── html
    │   ├── logs
    │   ├── sbin
    │   ├── sites-available
    │   ├── sites-enabled
    │   └── www
    ├── nginx.2
    │   ├── conf
    │   ├── html
    │   ├── logs
    │   ├── sbin
    │   ├── sites-available
    │   ├── sites-enabled
    │   └── www
    └── nginx.3
        ├── conf
        ├── html
        ├── logs
        └── sbin
```

tree -L 3 -P 'nginx.*'



**REGISTRAR E INICIALIZAR LOS SERVICIOS
PARA CADA AMBIENTE**

```
current.tlp - ubuntu@52.15.38.206:22 - Bitvise xterm-256color - ubuntu@ip-172-31-40-223: ~
ubuntu@ip-172-31-40-223:~$ ls -l /lib/systemd/system/nginx.*.service
-rw-r--r-- 1 root root 728 Jan 17 04:25 /lib/systemd/system/nginx.1.service
-rw-r--r-- 1 root root 729 Jan 17 04:36 /lib/systemd/system/nginx.2.service
-rw-r--r-- 1 root root 729 Jan 17 04:38 /lib/systemd/system/nginx.3.service
ubuntu@ip-172-31-40-223:~$ sudo systemctl enable nginx.1.service
ubuntu@ip-172-31-40-223:~$ sudo systemctl enable nginx.2.service
ubuntu@ip-172-31-40-223:~$ sudo systemctl enable nginx.3.service
ubuntu@ip-172-31-40-223:~$ sudo systemctl start nginx.1.service
ubuntu@ip-172-31-40-223:~$ sudo systemctl start nginx.2.service
ubuntu@ip-172-31-40-223:~$ sudo systemctl start nginx.3.service
ubuntu@ip-172-31-40-223:~$ sudo systemctl status nginx.1.service
● nginx.1.service - Nginx Server 1 - Principal /home/ubuntu/environment/nginx.1
   Loaded: loaded (/lib/systemd/system/nginx.1.service; enabled; vendor preset: enabled)
   Active: active (running) since Mon 2022-01-17 05:21:55 UTC; 47s ago
     Docs: man:nginx(8)
 Main PID: 27116 (nginx)
    Tasks: 2 (limit: 1147)
   Memory: 1.1M
      CGroup: /system.slice/nginx.1.service
              └─27116 nginx: master process /home/ubuntu/environment/nginx.1/sbin/nginx -g dae>
                  ├─27117 nginx: worker process
Jan 17 05:21:55 ip-172-31-40-223 systemd[1]: Starting Nginx Server 1 - Principal /home/ubuntu>
Jan 17 05:21:55 ip-172-31-40-223 systemd[1]: nginx.1.service: Failed to parse PID from file />
```

ls -l /lib/systemd/system/nginx.*.service
sudo systemctl enable nginx.n.service
sudo systemctl start nginx.n.service



```
current.tlp - ubuntu@52.15.38.206:22 - Bitvise xterm-256color - ubuntu@ip-172-31-40-223: ~
ubuntu@ip-172-31-40-223:~$ sudo systemctl status nginx.2.service
● nginx.2.service - Nginx Server 2 - Secundario /home/ubuntu/environment/nginx.2
    Loaded: loaded (/lib/systemd/system/nginx.2.service; enabled; vendor preset: enabled)
    Active: active (running) since Mon 2022-01-17 05:21:59 UTC; 2min 17s ago
      Docs: man:nginx(8)
   Main PID: 27124 (nginx)
     Tasks: 2 (limit: 1147)
    Memory: 1.1M
       CGroup: /system.slice/nginx.2.service
               └─27124 nginx: master process /home/ubuntu/environment/nginx.2/sbin/nginx -g dae>
                  ├─27125 nginx: worker process

Jan 17 05:21:59 ip-172-31-40-223 systemd[1]: Starting Nginx Server 2 - Secundario /home/ubuntu/>
Jan 17 05:21:59 ip-172-31-40-223 systemd[1]: Started Nginx Server 2 - Secundario /home/ubuntu/>
Jan 17 05:22:15 ip-172-31-40-223 systemd[1]: /lib/systemd/system/nginx.2.service:12: Unknown >
Jan 17 05:22:19 ip-172-31-40-223 systemd[1]: /lib/systemd/system/nginx.2.service:12: Unknown >
Jan 17 05:22:22 ip-172-31-40-223 systemd[1]: /lib/systemd/system/nginx.2.service:12: Unknown >
ubuntu@ip-172-31-40-223:~$ sudo systemctl status nginx.3.service
● nginx.3.service - Nginx Server 3 - Secundario /home/ubuntu/environment/nginx.3
    Loaded: loaded (/lib/systemd/system/nginx.3.service; enabled; vendor preset: enabled)
    Active: active (running) since Mon 2022-01-17 05:22:02 UTC; 2min 25s ago
      Docs: man:nginx(8)
   Main PID: 27132 (nginx)
     Tasks: 2 (limit: 1147)
```

sudo systemctl status nginx.n.service



```
current.tlp - ubuntu@52.15.38.206:22 - Bitvise xterm-256color - ubuntu@ip-172-31-40-223: ~
ubuntu@ip-172-31-40-223:~$ ps -ax | grep nginx
 27116 ?      Ss    0:00 nginx: master process /home/ubuntu/environment/nginx.1/sbin/nginx
-g daemon on; master_process on;
 27117 ?      S     0:00 nginx: worker process
 27124 ?      Ss    0:00 nginx: master process /home/ubuntu/environment/nginx.2/sbin/nginx
-g daemon on; master_process on;
 27125 ?      S     0:00 nginx: worker process
 27132 ?      Ss    0:00 nginx: master process /home/ubuntu/environment/nginx.3/sbin/nginx
-g daemon on; master_process on;
 27133 ?      S     0:00 nginx: worker process
 27288 pts/0   S+    0:00 grep --color=auto nginx
ubuntu@ip-172-31-40-223:~$
```

ps -ax | grep nginx



**HABILITAR LA LOS SITIOS DISPONIBLES
PARA CADA AMBIENTE**

NOTA

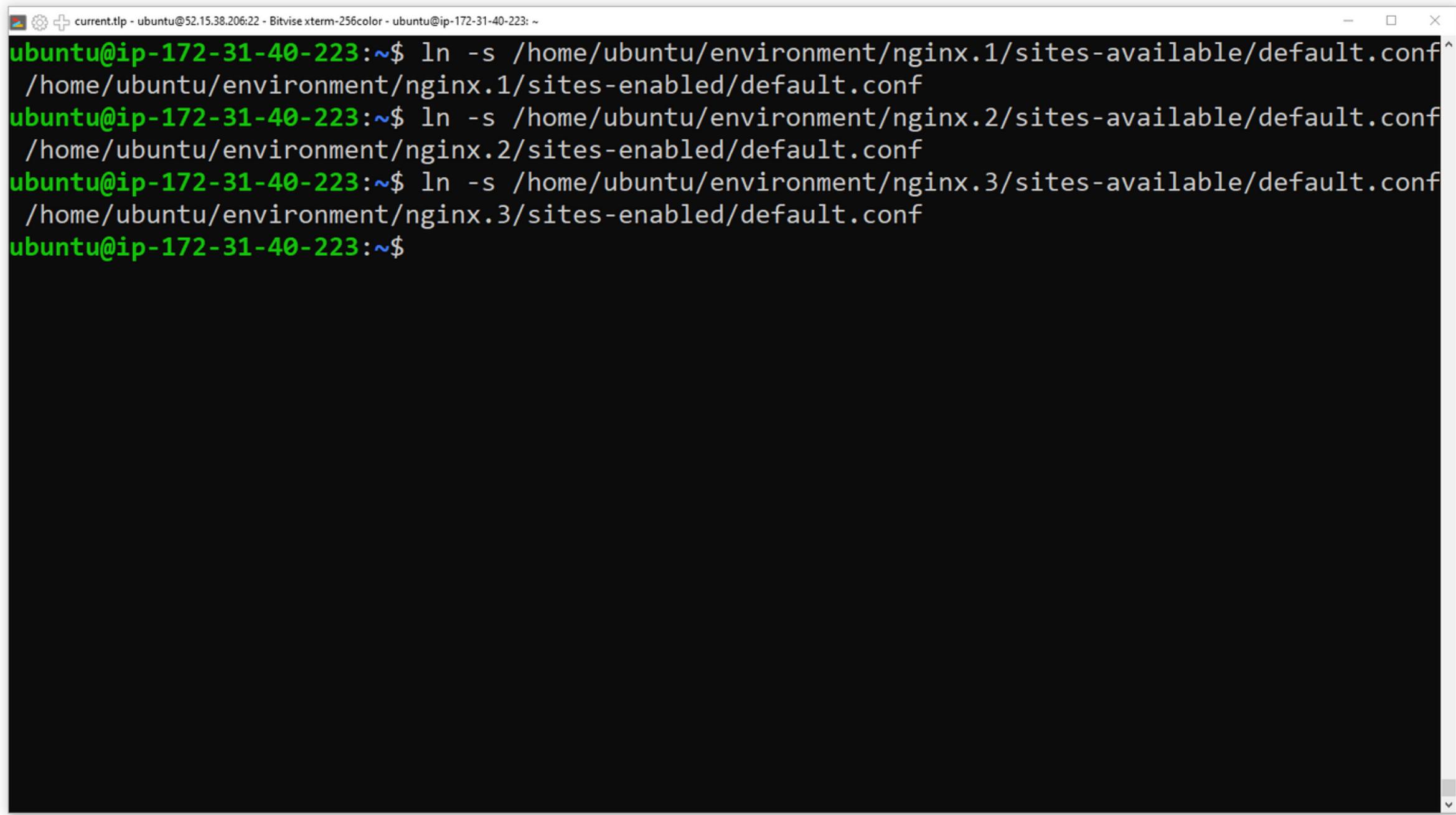
Hemos creado para cada ambiente dos carpetas **environment/nginx.n/sites-available** y **environment/nginx.n/sites-enabled**.

Sin embargo, la configuración para **environment/nginx.n/sites-available** no está integrada al archivo principal de configuración para cada ambiente (**environment/nginx.n/conf/nginx.conf**). Solamente se han incluido los archivos *.conf de la carpeta **environment/nginx.n/sites-enabled**.

Nuestro objetivo ahora es enlazar el archivo **environment/nginx.n/sites-available/default.conf** como un archivo simbólico **environment/nginx.n/sites-enabled/default.conf**.

Esto permitirá que Nginx integre la configuración del archivo **environment/nginx.n/sites-enabled/default.conf** proveniente de **environment/nginx.n/sites-available/default.conf**. Así, si lo deseamos podemos eliminar los archivos de **environment/nginx.n/sites-enabled** sin perder dichas configuraciones (se quedan en **environment/nginx.n/sites-available**).

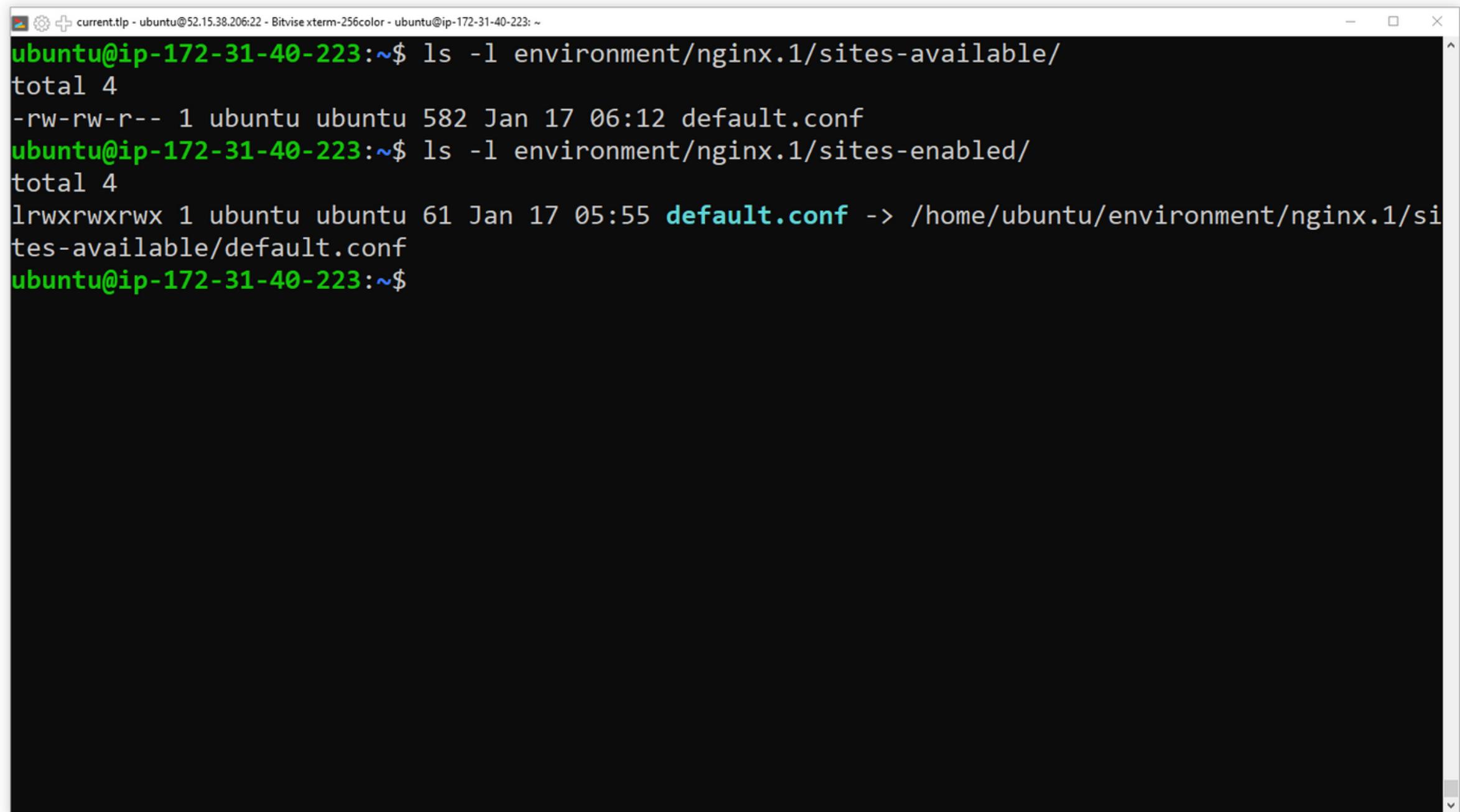




```
current.tlp - ubuntu@52.15.38.206:22 - Bitvise xterm-256color - ubuntu@ip-172-31-40-223: ~
ubuntu@ip-172-31-40-223:~$ ln -s /home/ubuntu/environment/nginx.1/sites-available/default.conf
/home/ubuntu/environment/nginx.1/sites-enabled/default.conf
ubuntu@ip-172-31-40-223:~$ ln -s /home/ubuntu/environment/nginx.2/sites-available/default.conf
/home/ubuntu/environment/nginx.2/sites-enabled/default.conf
ubuntu@ip-172-31-40-223:~$ ln -s /home/ubuntu/environment/nginx.3/sites-available/default.conf
/home/ubuntu/environment/nginx.3/sites-enabled/default.conf
ubuntu@ip-172-31-40-223:~$
```

ln -s /home/ubuntu/environment/nginx.n/sites-available/default.conf
/home/ubuntu/environment/nginx.n/sites-enabled/default.conf



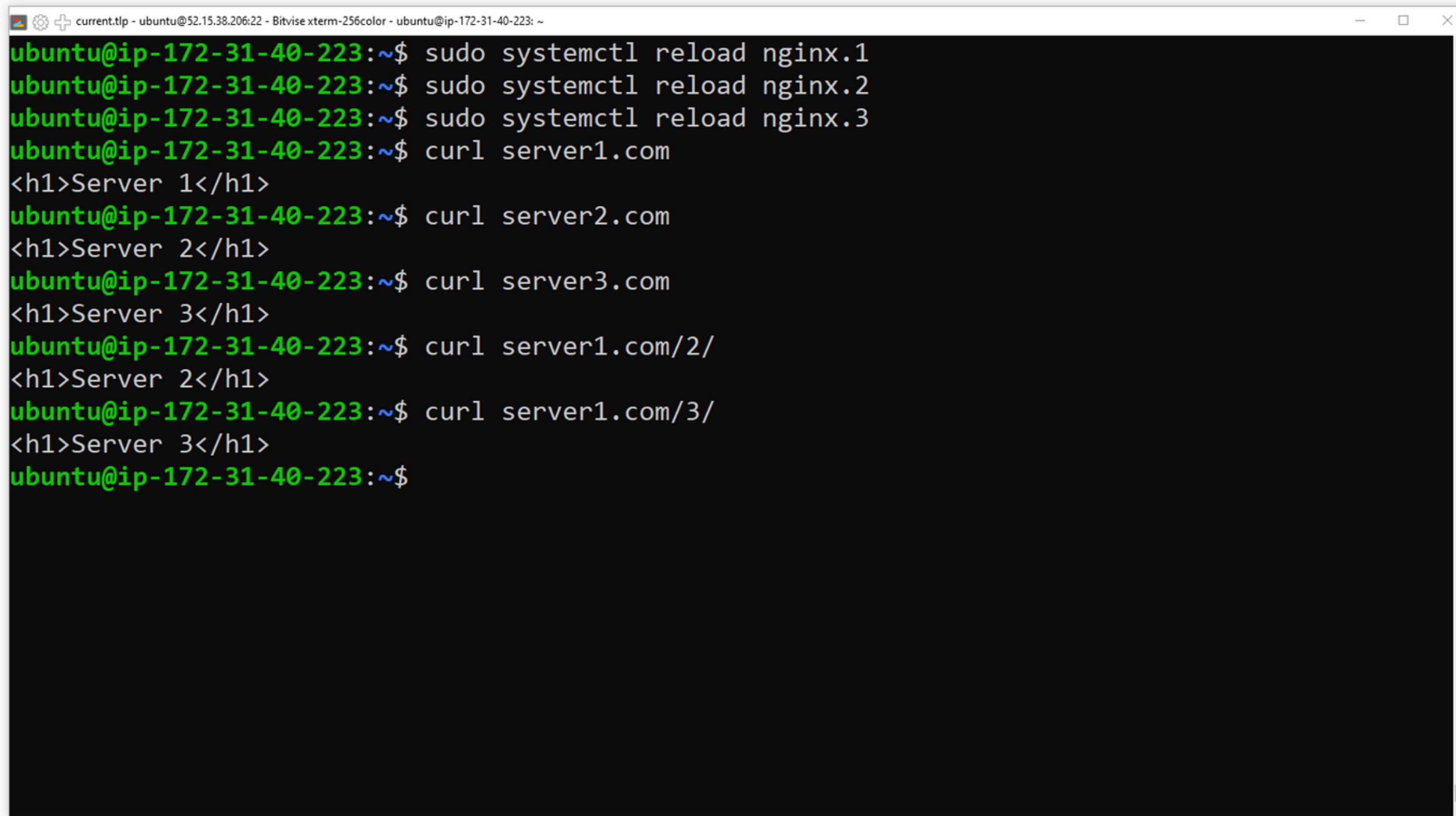


```
current.tlp - ubuntu@52.15.38.206:22 - Bitvise xterm-256color - ubuntu@ip-172-31-40-223: ~
ubuntu@ip-172-31-40-223:~$ ls -l environment/nginx.1/sites-available/
total 4
-rw-rw-r-- 1 ubuntu ubuntu 582 Jan 17 06:12 default.conf
ubuntu@ip-172-31-40-223:~$ ls -l environment/nginx.1/sites-enabled/
total 4
lrwxrwxrwx 1 ubuntu ubuntu 61 Jan 17 05:55 default.conf -> /home/ubuntu/environment/nginx.1/sites-available/default.conf
ubuntu@ip-172-31-40-223:~$
```

NOTA: Aquí se puede observar que en **sites-enabled** se encuentra el archivo **default.conf** enlazado hacia **sites-available**



RECARGAR LOS AMBIENTES



```
current.tlp - ubuntu@52.15.38.206:22 - Bitvise xterm-256color - ubuntu@ip-172-31-40-223: ~
ubuntu@ip-172-31-40-223:~$ sudo systemctl reload nginx.1
ubuntu@ip-172-31-40-223:~$ sudo systemctl reload nginx.2
ubuntu@ip-172-31-40-223:~$ sudo systemctl reload nginx.3
ubuntu@ip-172-31-40-223:~$ curl server1.com
<h1>Server 1</h1>
ubuntu@ip-172-31-40-223:~$ curl server2.com
<h1>Server 2</h1>
ubuntu@ip-172-31-40-223:~$ curl server3.com
<h1>Server 3</h1>
ubuntu@ip-172-31-40-223:~$ curl server1.com/2/
<h1>Server 2</h1>
ubuntu@ip-172-31-40-223:~$ curl server1.com/3/
<h1>Server 3</h1>
ubuntu@ip-172-31-40-223:~$
```

sudo systemctl reload nginx.n
curl servern.com



OBSERVACIONES (I)

En el **servidor 1 (nginx.1)** hemos colocado la definición de 3 servidores apuntando al puerto 80.

El servidor con nombre **server1.com** controla los archivos de la carpeta
/home/ubuntu/environment/nginx.1/www

Los servidores **server2.com** y **server3.com** redireccionan las peticiones hacia los puertos **3000** y **4000** respectivamente.

Al hacer el **proxy_pass** se incluye en cada servidor adicional **proxy_set_header Host server2.com** y **server3.com** respectivamente.

En los **servidores 2 y 3 (nginx.2 y nginx.3)** se han colocado definiciones para servidores virtuales para controlar los puertos **3000** y **4000** respectivamente. Y las peticiones se han enlazado a las carpetas **/home/ubuntu/environment/nginx.2/www** y **/home/ubuntu/environment/nginx.3/www**.

Las carpetas **/home/ubuntu/environment/nginx.n/www** contienen un archivo index.html cada una. En cada index.html se muestra un html simple que indica el nombre del servidor.



OBSERVACIONES (II)

El resultado final al llamar a las rutas es el siguiente:

```
http://server1.com/ --- nginx.1 --- / --- /home/ubuntu/environment/nginx.1/www/index.html  
http://server2.com/ --- nginx.2 --- / --- /home/ubuntu/environment/nginx.2/www/index.html  
http://server3.com/ --- nginx.3 --- / --- /home/ubuntu/environment/nginx.3/www/index.html
```

Adicionalmente las rutas de redirección para server1.com son:

```
http://server1.com/2/ --- nginx.1 --- /2/ --> http://server2.com/  
                                --> http://localhost:3000/ --- nginx.2 --- / --- /home/ubuntu/environment/nginx.2/www/index.html  
http://server1.com/3/ --- nginx.1 --- /3/ --> http://server3.com/  
                                --> http://localhost:4000/ --- nginx.3 --- / --- /home/ubuntu/environment/nginx.3/www/index.html
```

Cómo se puede observar, el servidor principal (nginx.1) absorbe la carga principal de redireccionar hacia los servidores secundarios (nginx.2 y nginx.3). Esto nos permite una arquitectura simple de fácil administración, en la cual podemos seguir integrando servidores adicionales con sus propios ambientes, ya sean de Nginx, Apache, Tomcat, Node, Python, etc.

Cada ambiente tendrá su propia configuración y compilación independiente, así como sus propios procesos. Esto nos permitirá realizar mantenimiento individual a cada sub-servidor en nuestro servidor principal y podremos evitar el bloqueo y recarga global.



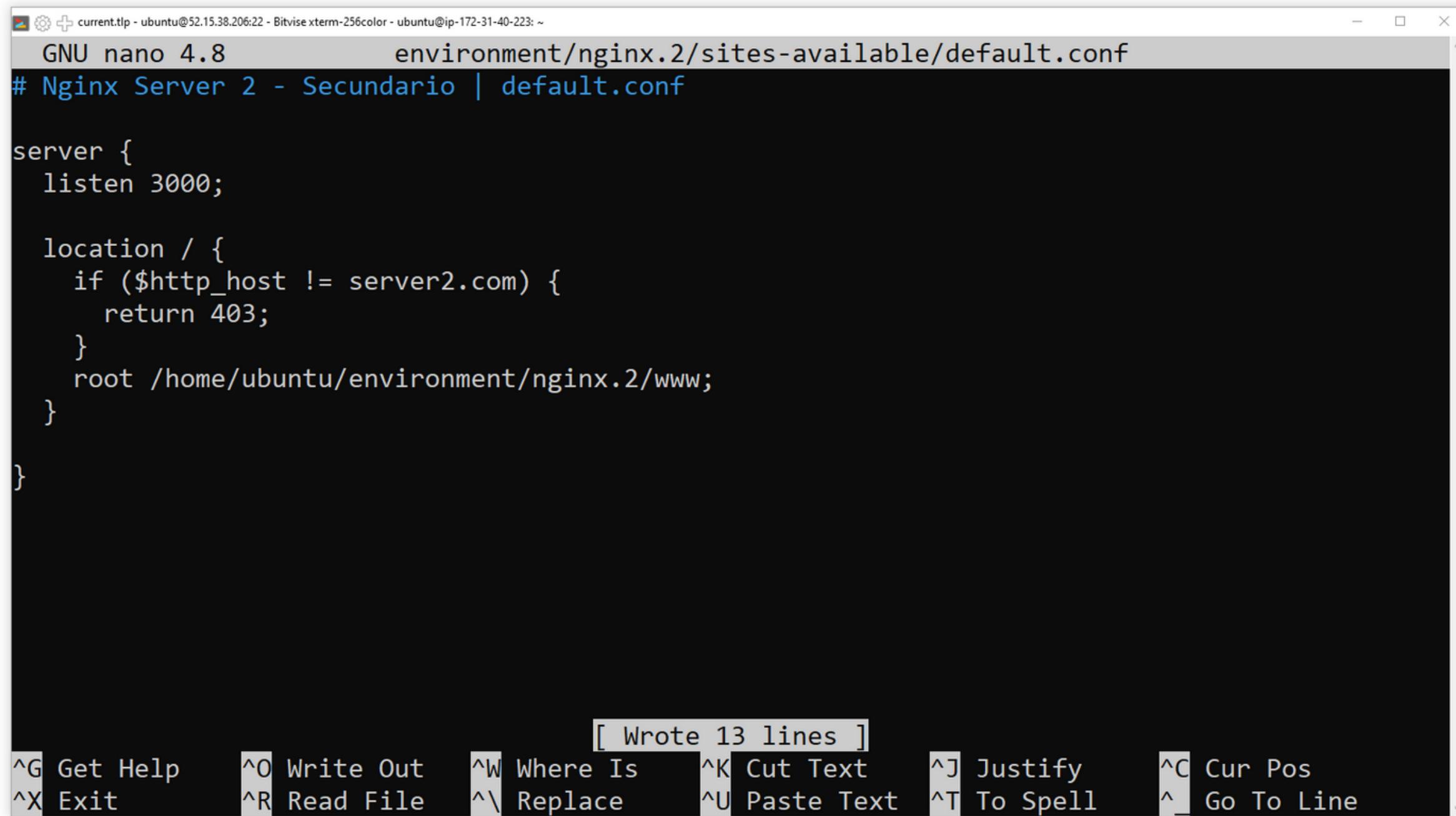
SEGURIDAD

~/environment/nginx.2/sites-available/default.conf

```
# Nginx Server 2 - Secundario | default.conf
```

```
server {  
    listen 3000;  
  
    location / {  
        if ($http_host != server2.com) {  
            return 403;  
        }  
        root /home/ubuntu/environment/nginx.2/www;  
    }  
  
}
```





The screenshot shows a terminal window titled "current.tlp" running on "ubuntu@52.15.38.206:22 - Bitvise xterm-256color - ubuntu@ip-172-31-40-223: ~". The window title bar also displays "GNU nano 4.8" and the file path "environment/nginx.2/sites-available/default.conf". The main content of the terminal is a portion of an Nginx configuration file:

```
# Nginx Server 2 - Secundario | default.conf

server {
    listen 3000;

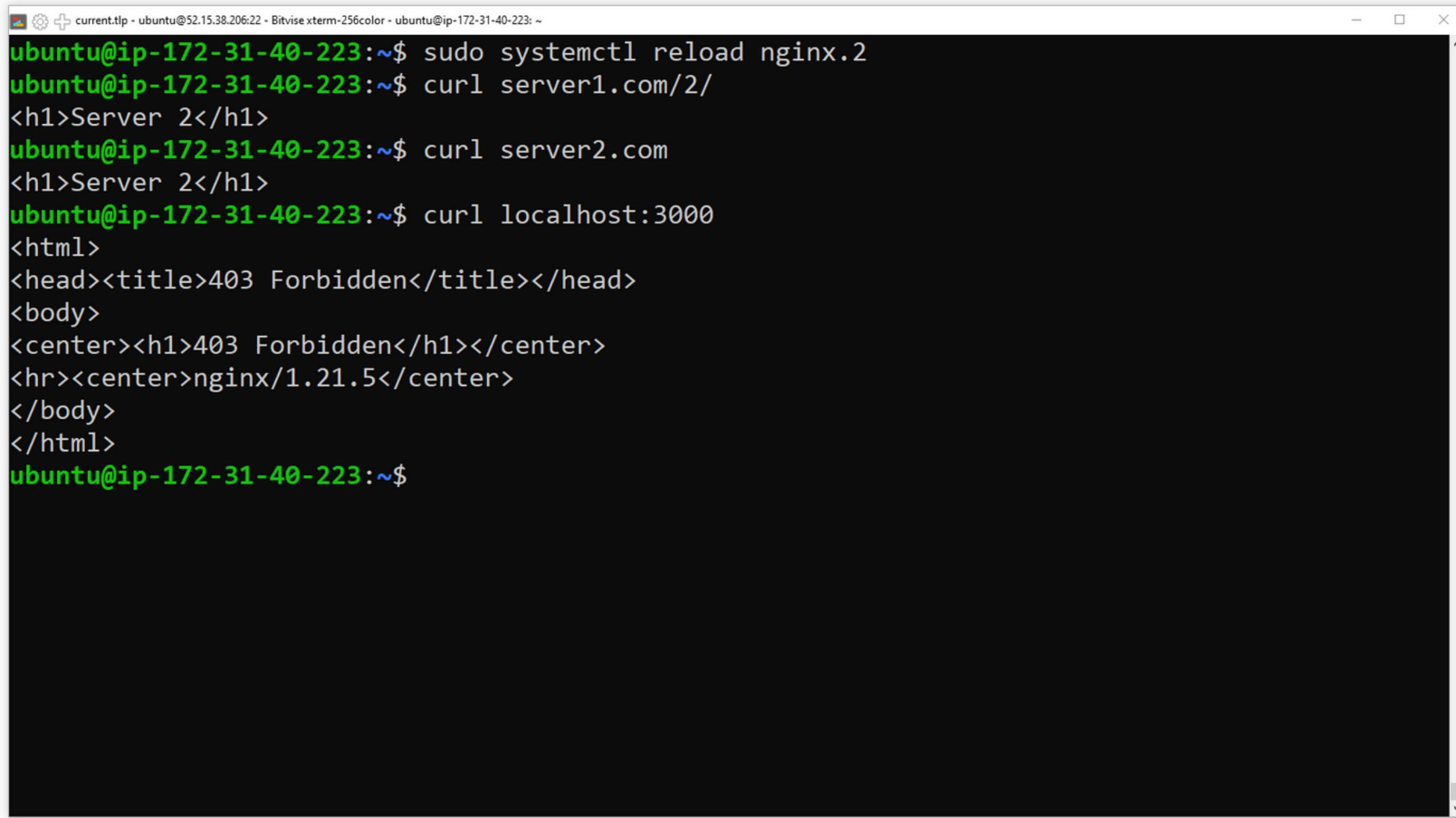
    location / {
        if ($http_host != server2.com) {
            return 403;
        }
        root /home/ubuntu/environment/nginx.2/www;
    }
}
```

At the bottom of the terminal window, there is a menu bar with the message "[Wrote 13 lines]". Below the menu bar, there is a series of keyboard shortcuts:

^{^G} Get Help	^{^O} Write Out	^{^W} Where Is	^{^K} Cut Text	^{^J} Justify	^{^C} Cur Pos
^{^X} Exit	^{^R} Read File	^{^V} Replace	^{^U} Paste Text	^{^T} To Spell	^{^_} Go To Line

nano environment/nginx.2/sites-available/default.conf





A screenshot of a terminal window titled "current.tlp" showing a session on "ubuntu@ip-172-31-40-223". The terminal displays the following commands and their outputs:

```
ubuntu@ip-172-31-40-223:~$ sudo systemctl reload nginx.2
ubuntu@ip-172-31-40-223:~$ curl server1.com/2/
<h1>Server 2</h1>
ubuntu@ip-172-31-40-223:~$ curl server2.com
<h1>Server 2</h1>
ubuntu@ip-172-31-40-223:~$ curl localhost:3000
<html>
<head><title>403 Forbidden</title></head>
<body>
<center><h1>403 Forbidden</h1></center>
<hr><center>nginx/1.21.5</center>
</body>
</html>
ubuntu@ip-172-31-40-223:~$
```

```
sudo systemctl reload nginx.2
curl server1.com/2/
curl server2.com
curl localhost:3000
```



CONCLUSIONES

Ya sabemos que **server1.com/2/** y **server2.com** son equivalentes, traen los mismos recursos llamados por el **servidor 2 (nginx.2)**. Sin embargo, este **servidor 2** es accesible por el puerto **3000**.

Si llamamos internamente **http://localhost:3000** o **http://server1.com:3000**, ambos consultarán el servidor enlazado al puerto **3000**. Dando como resultado el acceso a los recursos del **servidor 2 (nginx.2)**. Sin pasar por el dominio **server2.com**.

Esto podría ser inseguro en muchas situaciones y lo correcto es habilitar una capa de seguridad condicional que bloquee los recursos que no provengan del dominio **server2.com**.

Es por esto que finalmente debemos habilitar una condición **if (\$http_host != server2.com) return 403**, para que devuelva un código **403** (forbidden) a las peticiones que no provengan del dominio enlazado.

Esto permitirá que sólo los dominios enlazados con el **proxy_pass** y el **header host server2.com** o directamente al dominio **server2.com** nos devuelvan los recursos de manera segura. Es decir, para peticiones realizadas directamente sobre el puerto, los recursos no estén disponibles.



Proyecto Final

1. Habilita la seguridad para el dominio **server3.com**
2. Crea un servidor **Apache2** corriendo en el puerto **9000**
 - a. Instala **PHP FPM**
 - b. Configura **PHP FPM** para **Apache2**
 - c. Instala **MySQL**
 - d. Configura **MySQL**
 - e. Haz una prueba de conexión de **MySQL** en **PHP** desde **Apache2**
 - f. Instala **Wordpress**
 - g. Configura **Wordpress** en **Apache2** en el puerto **9000**
3. Crea el dominio virtual **mywordpress.com** (**/etc/hosts**)
4. En Nginx (**nginx.1**) enlaza el puerto **80** con el dominio **mywordpress.com**
5. Redirecciona las peticiones de **location /wordpress** hacia **Apache2** en el puerto **9000**
6. Verifica que **Wordpress** funcione correctamente desde **server1.com/wordpress**

